Engineering Open House

1977

Engineering:
Integrating the Sciences

University of Illinois
at Urbana-Champaign

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Curriculum	Undergraduate Enrollment (Fall, 1976)	Professors (approx. full-time equiv-alents, 1975)
Aeronautical and Astro-nautical Engineering	196	14
Agricultural Engineering	92	10
Ceramic Engineering	94	10
Civil Engineering	750	66
Computer Engineering	199	15
Computer Science	336	15
Electrical Engineering	1023	70
General Engineering	500	18
Mechanical and Indus-trial Engineering	749	37
Metallurgical Engi-neering	70	15
Nuclear Engineering	81	13
Physics	168	69
Theoretical and Applied Mechanics	21	26

For more information, contact:

Associate Dean's Office
207 Engineering Hall
University of Illinois
Urbana, IL 61801

Welcome!

Our students have chosen for their theme "Engineering: Integrating the Sciences" to emphasize the social dimensions, the social impact, and the responsiveness to societal need of modern engineering. Engineering is relevant and action oriented. Knowledge gleaned from experience must be added to the base of information provided by the mathematical, physical, biological, and social sciences to provide the best available proposal for solution to a technological problem or a societal problem with a strong technological component. In reaching out to serve society, engineering uncovers the need for greater understanding and so in turn stimulates scientific and engineering research. Engineering is pushed forward by the sciences and in turn pulls upon them. Here at one of the leading engineering schools in the world, renowned for its research and dedicated to teaching and public service, you can feel and see the process in action.

Engineering Open House has become one of our annual highlights. We are proud to have this opportunity to show you what the College of Engineering at the University of Illinois at Urbana-Champaign means to the people of the state. The students and faculty have been working very hard for the past year to make your visit to the 1977 Engineering Open House both pleasant and rewarding.

D. C. Drucker

D. C. Drucker, Dean

Engineering Open House

This year's Engineering Open House is the result of many years of evolution. Beginning around the turn of the century, various departments began to sponsor shows at which students and faculty collaborated in demonstrations and lectures. Inspired by the success which these previous shows had enjoyed, the first all-engineering open house was held in the spring of 1920. Other open houses, called Illinois Student Engineering Exhibitions, were held in later years, but were discontinued during World War II. Beginning in 1948, the newly named Engineering Open House was held biannually. In 1950 Open House was made an annual affair. Today the Engineering Open House is a well-planned and successful annual event.

Since its beginning, Engineering Open House has never been executed merely as an exhibition or stunt show. There are, in fact, three major objectives which Open House seeks to realize. The first goal has always been to provide the students participating with a valuable part of their education which is learned not so much in the classroom as in meeting rooms and around conference tables. The second objective is to better acquaint the public with some of the fundamental principles upon which the science of engineering is built, as well as with the facilities and work of the college. The third aim is to further the progress of engineering by demonstrating new advances in technology.

Engineering Open House is more than an exhibition or show--it's a major annual event which involves thousands of hours of preparation by engineering students throughout the year. We hope you will learn from and enjoy the results of their efforts.

The Buck Stops Here

One indication of the quality of an educational institution is how many research dollars it attracts for its projects. The College of Engineering, University of Illinois at Urbana-Champaign, had separately budgeted research expenditures of $19,139,000 for fiscal year 1976. When other major engineering-related research is included, UIUC's total is $26,303,000. These funds support a total of over 700 research projects.

Top-Ranked Schools by Profession*

Engineering	Fraction of** Choices
1. Massachusetts Institute of Technology	119/131
2. University of Illinois	84/131
2. Stanford University	84/131
4. University of California, Berkeley	67/131
5. California Institute of Technology	62/131
6. University of Michigan	58/131
7. Purdue University	42/131
8. Georgia Institute of Technology	14/131
8. University of Wisconsin	14/131

* Reprinted from Change magazine
** The number of Deans of Engineering who selected the indicated school as one of the five best in the U.S. divided by the number of Deans responding.

Engineering Open House 1977

"Engineering: Integrating the Sciences"

by Larry Brand, Chairperson EOH '77

The aim of this Engineering Open House is to inform the visitors about the profession of engineering. Viewing the fifteen buildings and hundreds of exhibits that are on display should impress upon the visitor the wide range of information that embodies engineering. But engineering is more than a collection of information, it is a procedure for applying knowledge.

Engineering is a process of examination, exploration, and integration. Engineers define a situation, which may be a physical problem or an area under investigation, and explore background knowledge of the field in question. They then integrate their knowledge of the problem at hand with their knowledge of the physical, chemical, biological, and mathematical sciences which apply to it and devise a solution. In real world situations, solutions to engineering problems are often constrained by sociological, environmental, and/or physiological requirements. The problem must then be further investigated in the light of these areas. Thus, an engineering procedure may integrate many social as well as physical sciences in determining a solution.

Visitors to this Engineering Open House are challenged to determine from the students presenting these exhibits the various scientific areas that have been integrated in each engineering situation.

Aeronautical and Astronautical Engineering

The Department of Aeronautical and Astronautical Engineering prepares students for participation in the exploration of space and for the application of aerospace technologies to the improvement of life on earth. Building on a strong foundation in mathematics, physics, and the engineering sciences, the program focuses on solid mechanics, propulsion, fluid mechanics, thermodynamics, structures, and control systems. Aerospace engineers are involved in looking for solutions to air and noise pollution, mass transportation, and the energy crisis.

Exhibits: (Aero Lab B)
- -Subsonic Wind Tunnel
- -Model Rocketry
- -Windmill Energy
- -Orbital Mechanics

Agricultural Engineering

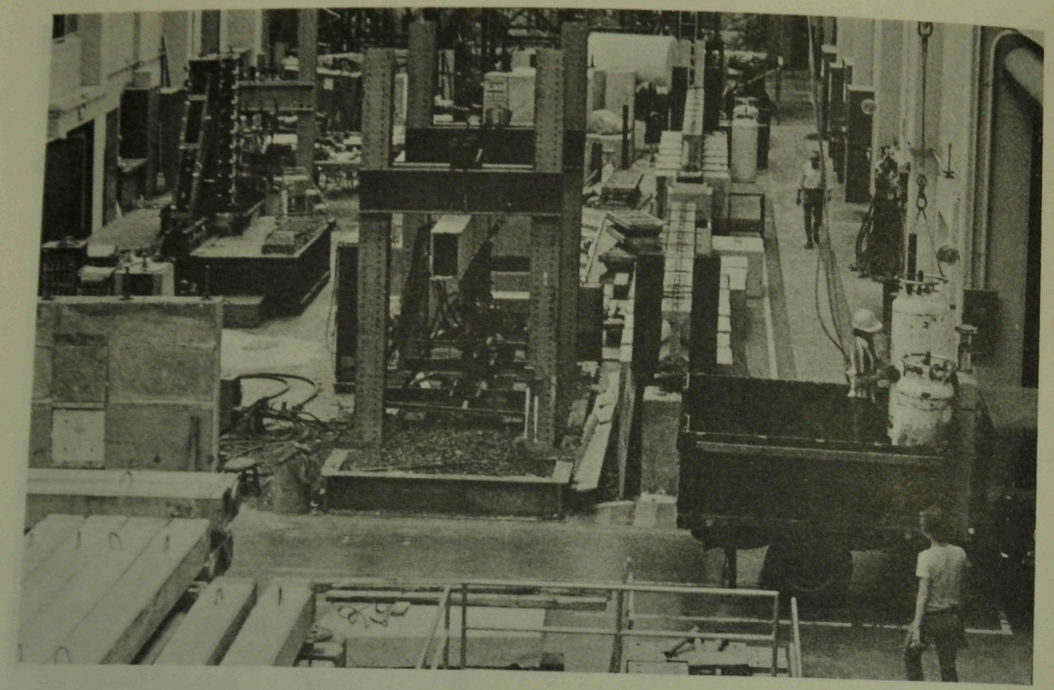
In order to provide the productivity to feed the over three billion inhabitants of earth, the agricultural industry requires a large amount of engineering technology. Agricultural engineering is the application of engineering principles to problems in agriculture. With the trend toward more complex machines and automation, there is a wide variety of choices of type and place of work open to the agricultural engineer. The profession has five major divisions, which are: power and machinery, soil and water, electrical power and processing, structures and environment, and food engineering.

Exhibits: (Ag. Eng. Bldg.)
- -Air Grain Header
- -Energy Efficient Farm
- -Feedlot Runoff Control Studies
- -Foods of the Future

Ceramic Engineering

Ceramic engineering deals with the processing of materials to create products which are generally most useful after high-temperature treatment. This subject and its related aspects offer students a wide range of topics to investigate, including nuclear fuels, electronic components, bioimplants, magnetic materials, and catalysts. These newer applications of ceramics are complimented by the older, more basic ceramic industries which include: cement, glass, tile, porcelain, abrasives, brick and structural products, refractories, and porcelain enamels.

Exhibits: (Ceramics Building)
- -Sintering of $BaTiO_3$
- -Porcelain Enamels
- -Ceramics in Automotive Emissions Control



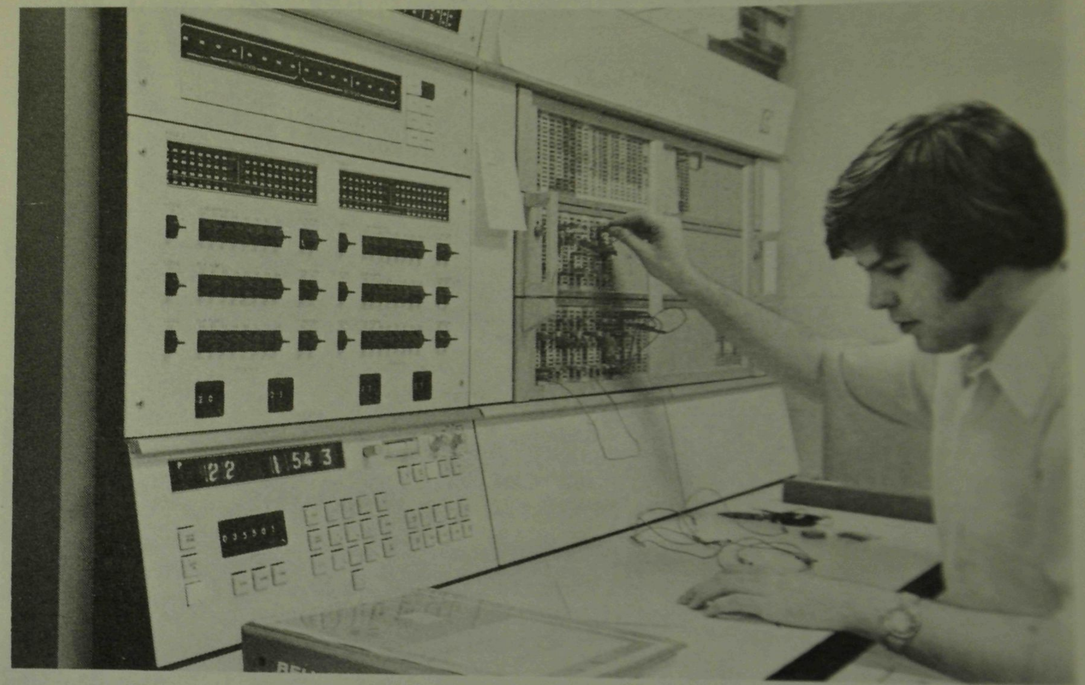
Civil Engineering

Civil engineers are primarily responsible for planning the design and construction of various structures. This department's curriculum provides a foundation in the physical and engineering sciences that can be applied to the design and construction of buildings, bridges, dams, nuclear installations, and to surveying and mapping and other engineering projects. The most common areas of civil engineering specialization are: construction, environmental, geotechnical, hydraulic and hydrologic, ocean, photogrammetric and geodetic, and structural engineering.

Exhibits: (4th floor Eng. Hall and Civil Eng. Building)
- -Transportation
- -Model Bridge Spanning Contest
- -Concrete Canoe

Computer Engineering

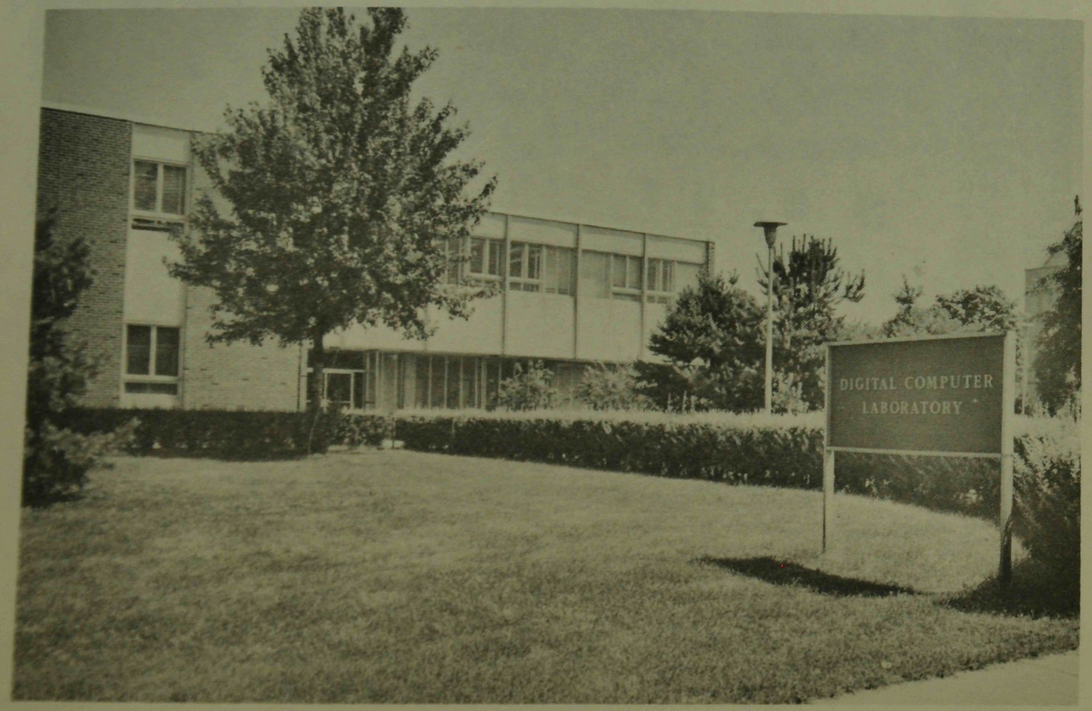
Computer engineering is a hybrid program of electrical engineering and computer science. The emphasis is on the design of hardware for computer processing. ("Hardware" refers to the machinery and equipment, while "software" refers to computer languages and programming.) Students in this curriculum receive basic training in electrical engineering and computer science subjects.

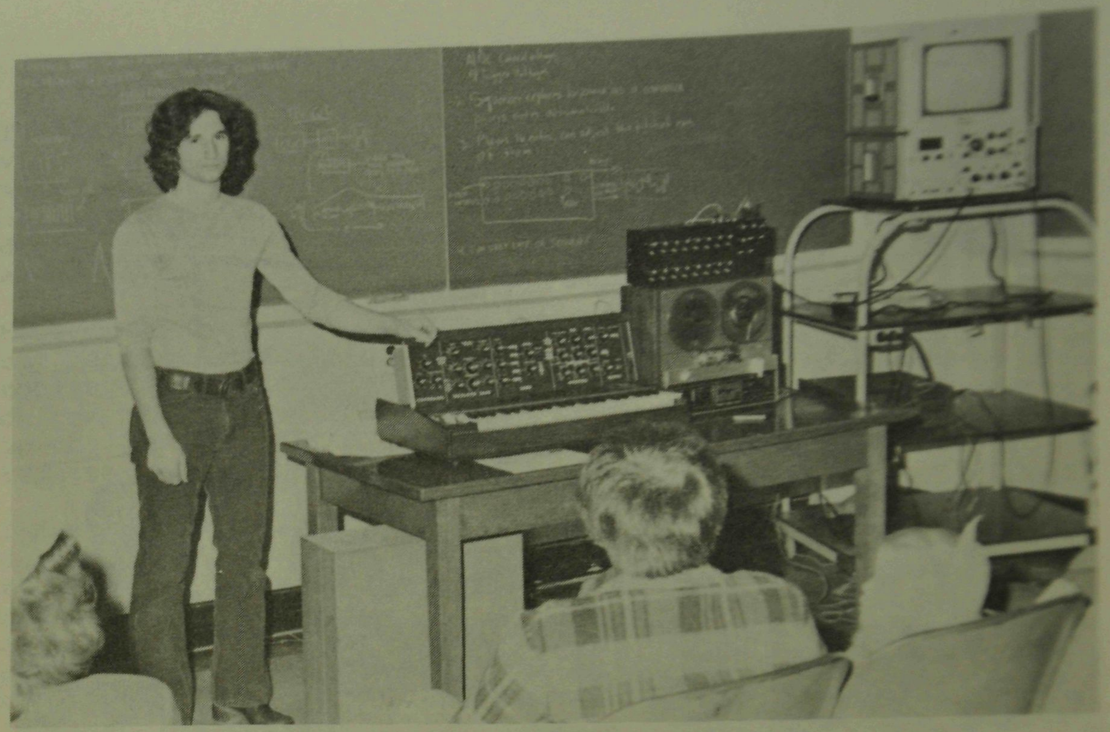


Computer Science

The field of computer science encompasses the design of the machine itself and the equipment used by it (the "hardware"), the programs which run on it (the "software"), the methods incorporated in such programs (numerical analysis), and the theory behind it all. Students take courses in each area in order to acquire a broad knowledge of the field. The department conducts research and teaches courses in such areas as programming, logical design, computer circuits, numerical analysis, automated theory, threshold logic, and switching theory.

Exhibits: (D.C.L.)
- -Tours
- -Hardware Exhibits
- -Logical Devices





Electrical Engineering

Electrical engineering is the study of electrical phenomena and their practical application in real-world situations. The electrical engineer has a wide range of studies from which to choose, including power generation and distribution, control systems, computers, antennas, electronics, radar, radio astronomy, and lasers.

The Department of Electrical Engineering prepares students for responsible engineering positions in research, development, design, operations, sales, and administration. Since more than half of the program of study is elective, the student is allowed to choose a particular area of interest and acquire a strong background in it. Many of the department's instructors are engaged in research in the above areas, making the department a place to learn established fundamentals while exploring new realms.

Exhibits: (Electrical Eng. Building)
- -Electrostatics
- -Tesla Coil
- -"Ozzie" the Talking Oscilloscope
- -Mouse in a Maze--a Computerized "Mouse"

General Engineering

The education of the general engineer is more diversified than traditional engineering programs generally allow. General engineering is a comprehensive program in the basic sciences, the engineering sciences, a chosen scientific field of concentration, and project design methods.

The core of the curriculum is engineering design. The design courses cover the basic concepts and methodologies in structural design, machine design, and control systems. Following the emphasis on design, another special feature of the general engineering program is the opportunity to select a secondary field of concentration. Twenty-one hours of electives can be organized to gain a depth of understanding in a chosen related field.

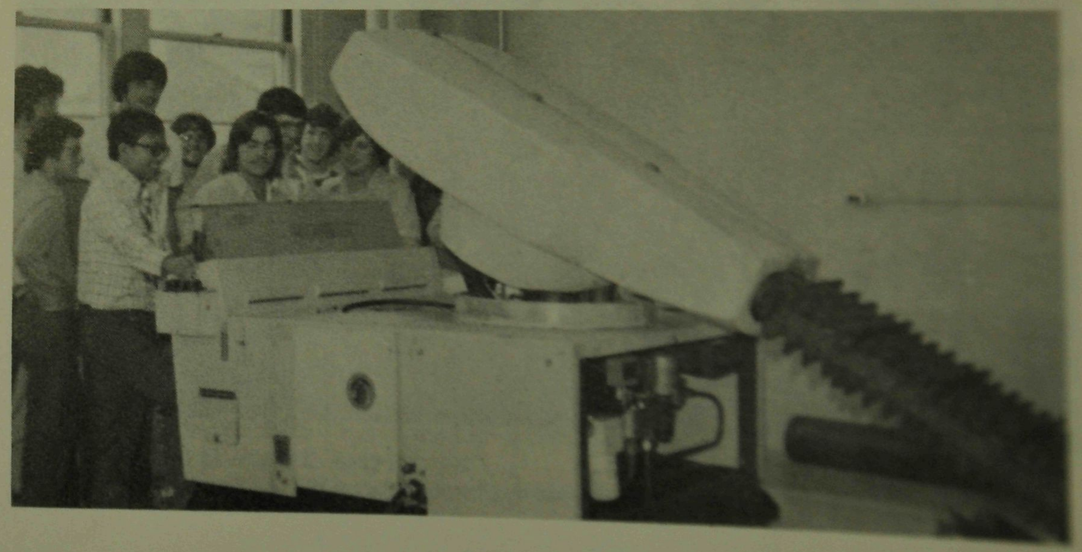
Mechanical and Industrial Engineering

The Department of Mechanical and Industrial Engineering provides a theoretical background for a career which employs knowledge of computer-controlled systems, metal and material characteristics, systems planning and optimization, machine design methods, heat transfer and thermodynamics, and basic economics.

Mechanical engineers are concerned with the use and economical conversion of energy to provide power, light, heat, cooling, and transportation. They design and produce machines to lighten the burden of human work, and they engage in the creative planning, development, and operation of systems for using energy, machines, and resources.

Industrial engineers are involved in determination of production sequences for economy of human resources, the correct selection of equipment for processing materials at a reasonable price, and selection of materials to enable an economic fabrication. They coordinate all of the above to produce a product or service with a satisfactory price at a suitable time.

Exhibits: (Mech. Eng. Building)
- -Dynamometer Testing
- -An Integrated System of Ingenious Mechanisms
- -Roby Robot
- -Trials of Golf

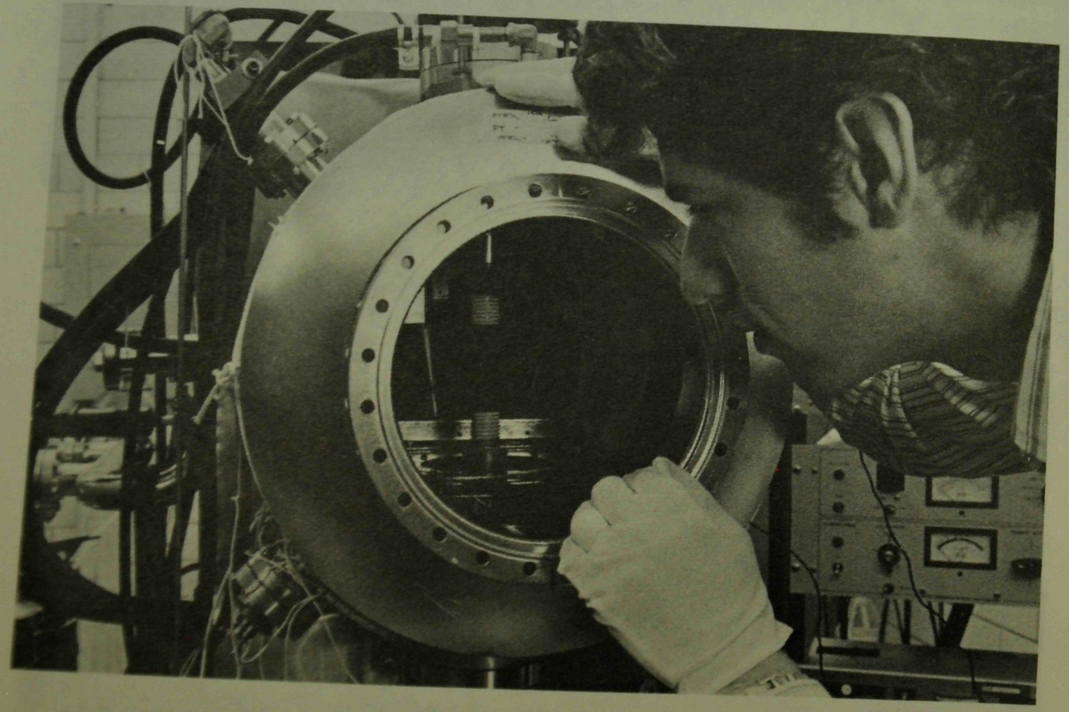


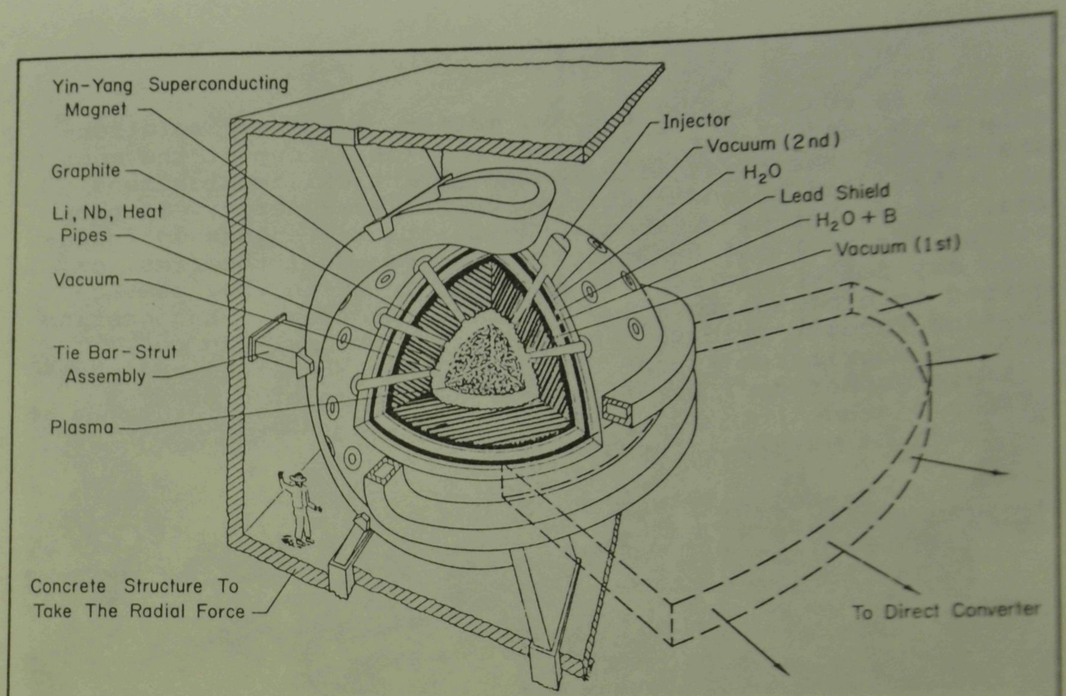
Metallurgical Engineering

The design and control of the properties of metals and their alloys are the focus of the study of metallurgy. The curriculum at UIUC emphasizes the relationships between atomic structures and mechanisms, and the mechanical properties of materials. This approach is equally useful in understanding and using current materials and in developing new alloys.

Classes within the department are small, with many opportunities for student-faculty contact. Courses in such diverse metallurgy fields as powder metallurgy, nuclear reactor materials, and polymers (plastics) allow the pursuit of individual interests.

Exhibits: (Met. & Mining Building)
- -Scanning Electron Microscope
- -Powder Metallurgy
- -Non-Destructive Testing
- -The Steel Industry





Schematic Diagram of Illio-Ball-I

Nuclear Engineering

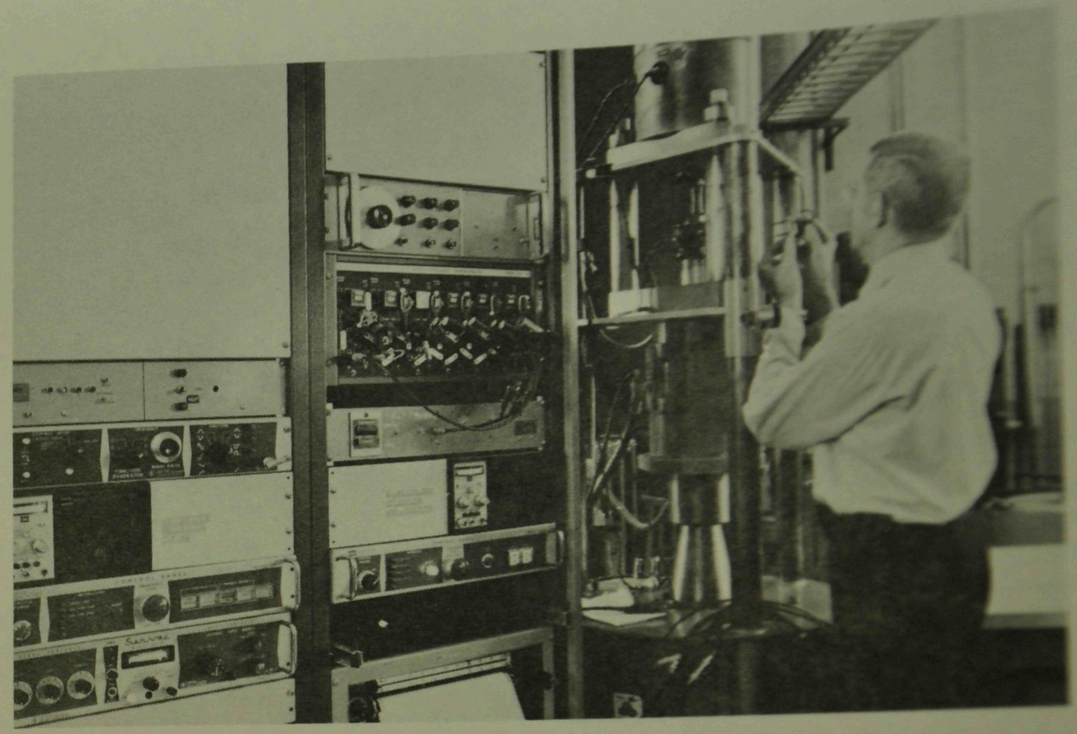
Satisfying society's energy needs is the primary concern for students in nuclear engineering. This subject and its related aspects offer students a wide range of topics to study. Energy sources considered extensively are those of fission and fusion. General topics currently researched are reactor physics and kinetics, radiation shielding and dosimetry, fission product yield, neutron activation analysis, and heat transfer and fluid mechanics in reactor systems. Research is also being conducted on the nuclear fuel cycle and waste management, direct energy conversion and controlled nuclear fusion which concerns plasma dynamics, injection heating and fueling, and a study of various plasma confinement devices, an example of which is pictured above.

Exhibits: (Nuclear Radiation Lab, NRL II)
- -Tours through TRIGA (1.5 MW thermal research reactor)
- -Tours of GUS (graphite-uranium subcritical assembly)
- -Multichannel Analyzer
- -Model of a Plasma Confinement Device

Physics

Physics is the study of energy, matter, and their relationship with one another. Although physics is one of the most abstract of the physical sciences, practical applications of it have led to such advances as nuclear energy, electronics, and rocket propulsion. Physicists may engage in fundamental research and constructing mathematical theories, or they may delve into applied physics, in which they use acquired information to solve practical problems. Engineering physics focuses primarily on the applications. In the physics curriculum advanced courses in mathematics and physics are emphasized, but a liberal allowance of electives allows a student to study a specific field of engineering in which he may be interested.

Exhibits: (Physics Bldg.)
- -Spark Chamber
- -PLATO
- -Lasers



Theoretical and Applied Mechanics

Theoretical and applied mechanics considers the mechanical forces and their consequent results on bodies as diverse as skyscrapers, airplane fuselages, waterways, and molten metals. The emphasis of study is on the analysis, either theoretical, experimental, or both, of given mechanical designs. The program prepares students for research and development in engineering and includes courses in the basic and engineering sciences.

UIUC Student Chapters of Professional Societies

While in the process of becoming the type of engineer you want to become, don't overlook opportunities to broaden your exposure! You may discover a new area of interest that is in harmony with your goals. The UIUC student branches of professional engineering societies are open to participation by all interested engineering students--you don't have to be a particular major to get in on the action. Here are some that are available.

Engineering Societies

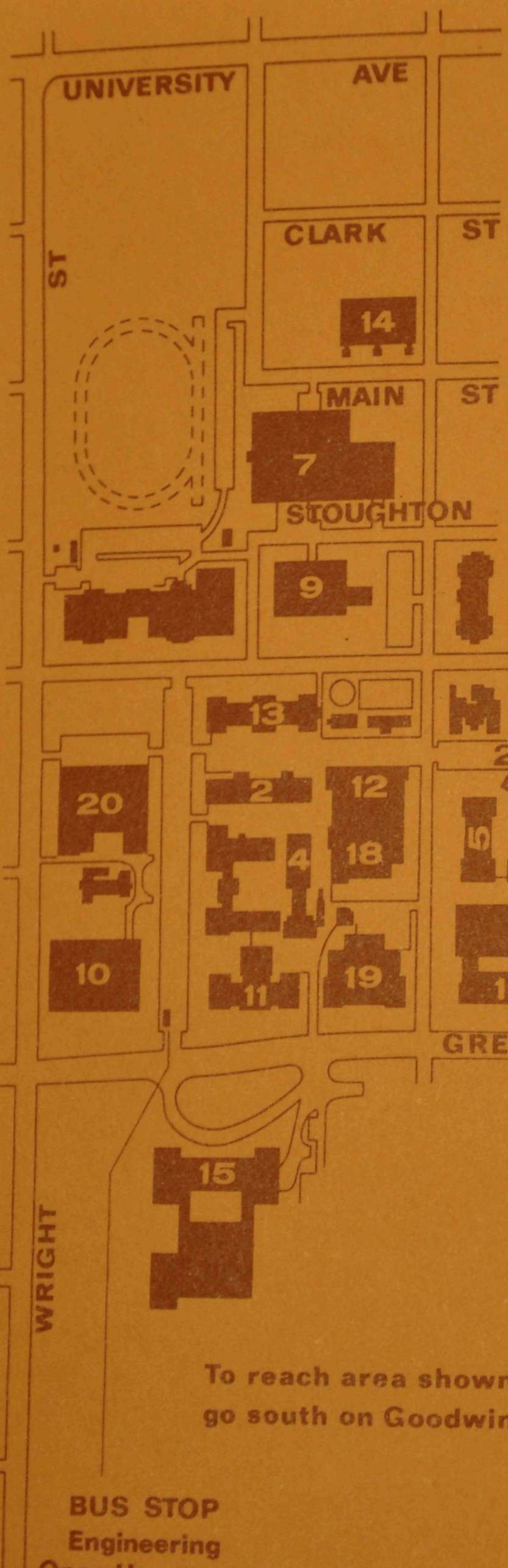
American Academy of Mechanics, Student Branch of (Previously Engr. Mech. Soc.) (AAM)
American Ceramic Society (ACS)
American Foundrymen's Society (AFS)
American Institute of Aeronautics & Astronautics (AIAA)
American Institute of Industrial Engineers (AIIE)
American Nuclear Society (ANS)
American Society of Agricultural Engineers (ASAE)
American Society of Civil Engineers (ASCE)
American Society of Mechanical Engineers (ASME)
Association for Computing Machinery (ACM)
Associated General Contractors (AGC)
Black Engineering Student Association (BESA)
Illinois Society of General Engineers (ISGE)
Institute of Electrical and Electronics Engineers (IEEE)
Institute of Traffic Engineers (ITE)
Physics Society (PS)
Society of Automotive Engineers (SAE)
Society of Co-operative Engineers (SCE)
Society of Women Engineers (SWE)
University of Illinois Metallurgical Society (UIMS)

Programs and Events Associated with Engineering Open House

SITE

Student Introduction to Engineering
--Sponsored by the College of Engineering to acquaint High School Juniors and Seniors with engineering as a profession.
Campus Tours 1 p.m. Thursday, March 3, 1977
Banquet 6 p.m. Thursday, March 3, 1977, Illini Union Ballroom
Engineering Department Tours 10:30 a.m. Friday, March 4, 1977, Physics Bldg.

St. Pat's Ball Saturday, March 5, 1977
Apollo and Century Rooms at Century Twentyone
Dinner 7-9 p.m.
Dance 9-12 p.m.
Music Rudy James 5-piece Band



1. Aeronautical Lab A
2. Aeronautical Lab B
3. Agricultural Eng Bldg
4. Bioacoustics Lab
5. Transportation Bldg
6. Ceramics Bldg
7. Civil Eng Bldg
8. Coordinated Science Lab
9. Digital Computer Lab
10. Electrical Eng Bldg
11. Engineering Hall
12. Engineering Research Lab
13. Foundry
14. Hydrosystems Lab
15. Illini Union
16. Materials Research Lab
17. Mechanical Eng Bldg
18. Mechanical Eng Lab
19. Metallurgy and Mining Eng Bldg
20. Talbot Lab
21. Nuclear Eng Lab
22. Nuclear Radiation Lab
23. Nuclear Reactor Lab
24. Physics Bldg

NORTH

To reach area shown in insert go south on Goodwin Ave

BUS STOP
Engineering Open House Bus to Linear Accelerator, Assembly Hall, & Ag. Eng. Campus.